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PRIORITY DOCUMENT

I HEREBY CERTIFY that annexed hereto is a true copy of documents filed in connection with the following patent application:

Application No. S2000/0599

Date of Filing 26 July 2000

Applicant RICHMOUNT COMPUTERS LIMITED, an Irish Company of Maple House, South County Business Park, Leopardstown, Dublin 18, Ireland.

Dated this 16 day of March 2001.

W. Kelly

PP An officer authorised by the
Controller of Patents, Designs and Trademarks.

S 000599

FORM NO. 1

**REQUEST FOR THE GRANT OF A PATENT
PATENTS ACT, 1992**

The Applicant named herein hereby request

 the grant of a patent under Part II of the Act

 X the grant of a short-term patent under Part III of the Act

on the basis of the information furnished hereunder.

1. APPLICANT

Name

RICHMOUNT COMPUTERS LIMITED

Address

Maple House, South County Business Park,
Leopardstown, Dublin 18, Ireland.

Description/Nationality

An Irish Company

2. TITLE OF INVENTION

"Fibre Channel Arbitrated Loop Without Port Bypass Circuits Using an Analogue Crossbar Switch"

**3. DECLARATION OF PRIORITY ON BASIS OF PREVIOUSLY FILED
APPLICATION FOR SAME INVENTION (SECTIONS 25 & 26)**

Previous filing date

Country in or for
which filed

Filing No.

4. IDENTIFICATION OF INVENTOR(S)

Name(s) of person(s) believed by Applicant(s) to be the inventor(s)

1.

Address

1.

5. STATEMENT OF RIGHT TO BE GRANTED A PATENT (SECTION 17(2)(B))

By virtue of

Contd./...

6. ITEMS ACCOMPANYING THIS REQUEST - TICK AS APPROPRIATE

- (i) ☒ prescribed filing fee EUR 63.49 (£50.00)
- (ii) ☐ specification containing a description and claims
☒ specification containing a description only
☒ Drawings referred to in description or claims
- (iii) ☐ An abstract
- (iv) ☐ Copy of previous application(s) whose priority is claimed
- (v) ☐ Translation of previous application whose priority is claimed
- (vi) ☐ Authorisation of Agent (this may be given at 8 below if this Request is signed by the Applicant(s))

7. DIVISIONAL APPLICATION

The following information is applicable to the present application which is made under Section 24

Earlier Application No:
Filing Date:

8. AGENT

The following is authorised to act as agent in all proceedings connected with the obtaining of a Patent to which this request relates and in relation to any patent granted -

Name
F. R. KELLY & CO.

Address
at their address as recorded for the time being in the
Register of Patent Agents

9. ADDRESS FOR SERVICE (IF DIFFERENT FROM THAT AT 8)

RICHMOUNT COMPUTERS LIMITED
F. R. KELLY & CO.

By:


EXECUTIVE

Date: July 26, 2000.

Overview

There are currently three enclosure hub architectures under consideration, the XL500 type architecture, the VSC7148 type architecture and a digital hub type architecture.

This paper introduces another alternative for discussion. The architecture comes in two parts, a Loop Data Integrity Checker and a hub based on an analogue crosspoint switch.

Nomenclature

There is plenty of confusion about what constitutes a hub and a switch, in order to clarify that I've defined them here:

- Hub: A hub is really a repeater which works by exposing all possible destinations to a packet from a given source (and the interested destination takes it).
- Switch: A switch is something that makes use of the datalink addresses to move traffic only between the interested source and destination pairs.
- Crosspoint Switch: A device with several inputs and outputs which can allow any output to be connected to any input. Also known as a crossbar switch. Despite its name it is not a switch as defined above, although it may be used as one component in a switch.

In a lot of cases we say switch when we really mean hub. All the proposals on the table at the moment are hub based proposals, not switch based. It's possible that one of the chips may be a hybrid (hub for some types of data frames, switch for others) but that is not clear at the time of writing.

Problems

The problems we are trying to solve at the moment are:

- We want to add a significant amount of loop diagnostics capability.
- We do not want to lower performance significantly.
- We do not want a huge increase in product cost.

Crosspoint based Hub

Vitesse have recently brought out a family of analogue crosspoint switch chips with a bandwidth of 2.5Gb/s. Samples are available now with production before the end of the year. There are three versions, a 17x17, a 34x34 and a 64x65. (The first number refers to the number of inputs and the second refers to the number of outputs). The two smaller ones also have some very basic signal monitoring capabilities. Using these devices we could build a hub as shown in figure 2 below. Vitesse reps have indicated that the port to port latency is in the order of 7nS, at the time of writing I'm still waiting for that to be confirmed.

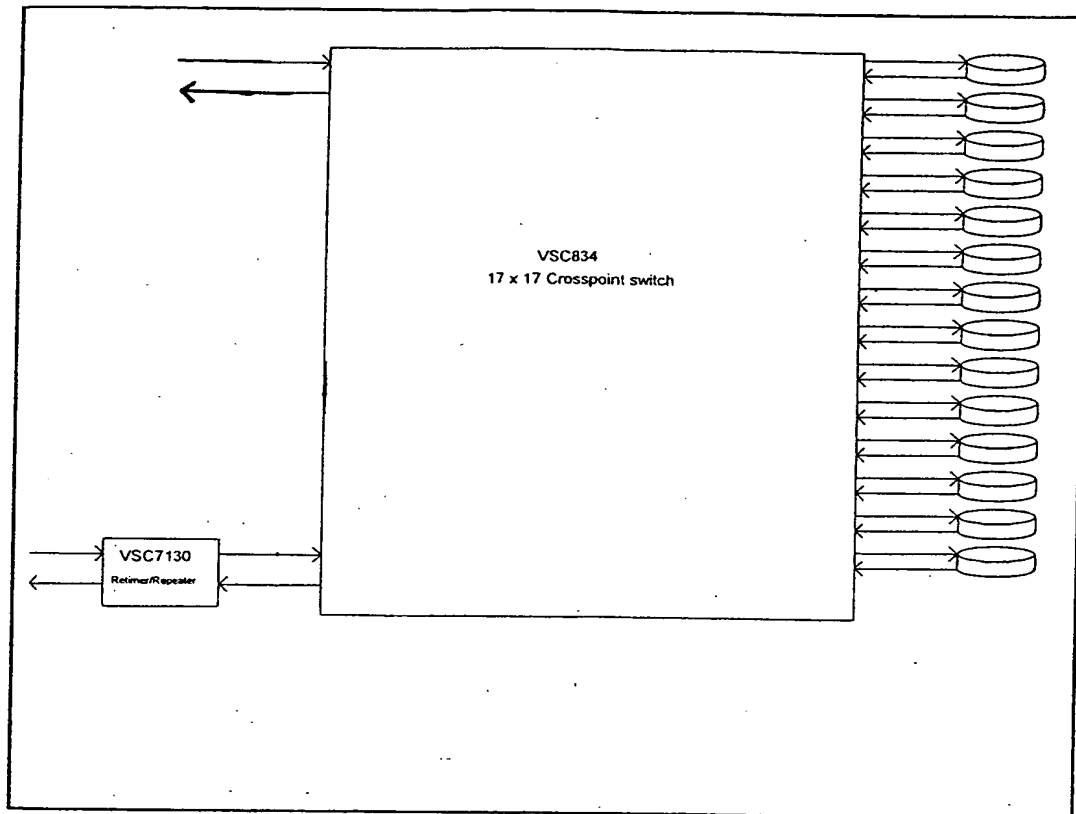


Figure 2:

Crosspoint based hub.

Crosspoint Hub based Features:

Performance:

- Approx same performance as XL500.
- If incoming regenerator can optionally retimer then the outgoing retimer may not be necessary since data stream would then always be coming straight from a retimer. (A disk is a retimer). Incoming regenerator would be set to retimer only when there are no disks in the shelf. Removing the outgoing retimer would increase performance slightly.

point on the loop. Moving the LDIC is invisible to the devices on the loop, thus does not cause any loop events, ie no LIPS.

- There is a Loss of Activity monitor on every input to the crosspoint switch at all times.

Other features:

- The disks in the loop can be configured in any desired order within a shelf, or can be reconfigured as required.
- Up to four loops can be built within a shelf with no extra hardware. (Two on the A loop and two on the B loop.
- Private loops can be built to test specific drives offline, (see note in LDIC section on generating data).
- If a RAID controller is plugged in then separate host and drive loops can be created within the shelf.

Performance

Based on the same methods as in the "Fibre Channel Performance Issues" white paper the following performance would be expected, this shows there would be no performance penalty over the current XL500 solution.

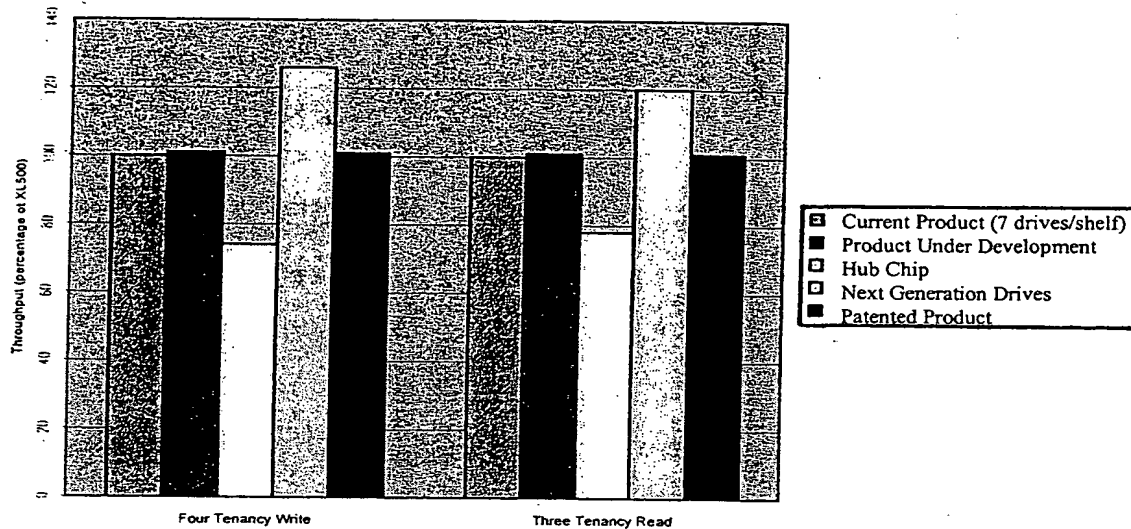


Figure 1: Expected performance

Conclusions

- A high level of diagnostics capability can be achieved without a digital hub chip.
- The current cost of a crosspoint hub is comparable with a digital hub. However there are a lot of opportunities for cost reduction of the crosspoint version.
- I feel this architecture deserves further discussion investigation.